murdoch children's research institute

Rethinking vaccine strategies for vulnerable populations

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1 in 5 people globally suffer from impaired immunity
Increased risk for severe respiratory virus disease outcomes

- By **2050** around **22%** of the world's population will **be aged >60 years**
  - **1.8-2.1 Billion people**
  - Affected by immunosenescence

- **~4%** of the world's population is affected by one of >80 different types of autoimmune diseases
  - **330 million people**
  - Often treated with immunosuppressants

- Cancer patients, transplant patients
  - Often treated with immunosuppressants

www.who.int/news-room/fact-sheets/detail/ageing-and-health
Hayter & Cook 2012 Autoimmunity Reviews

Traditional vaccines induce antibodies

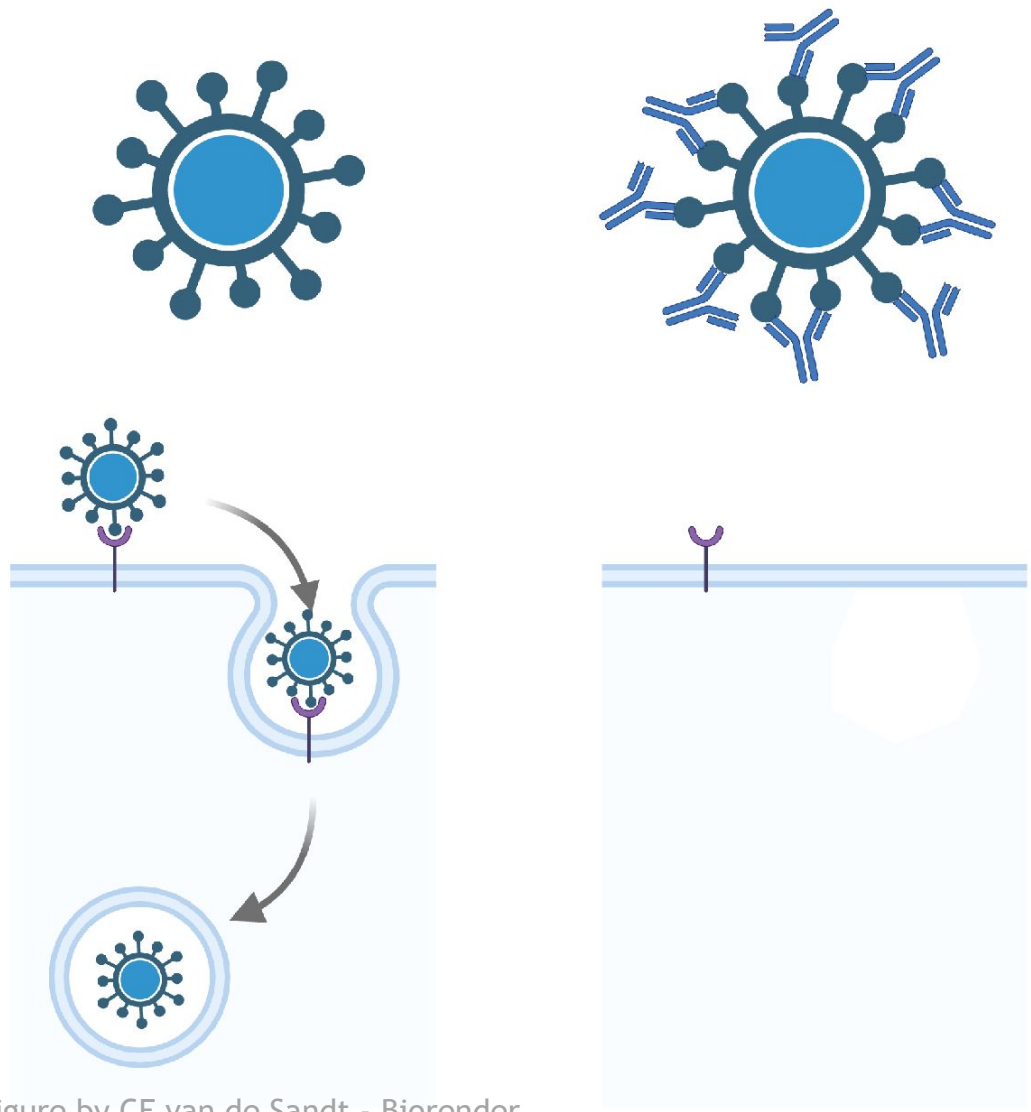
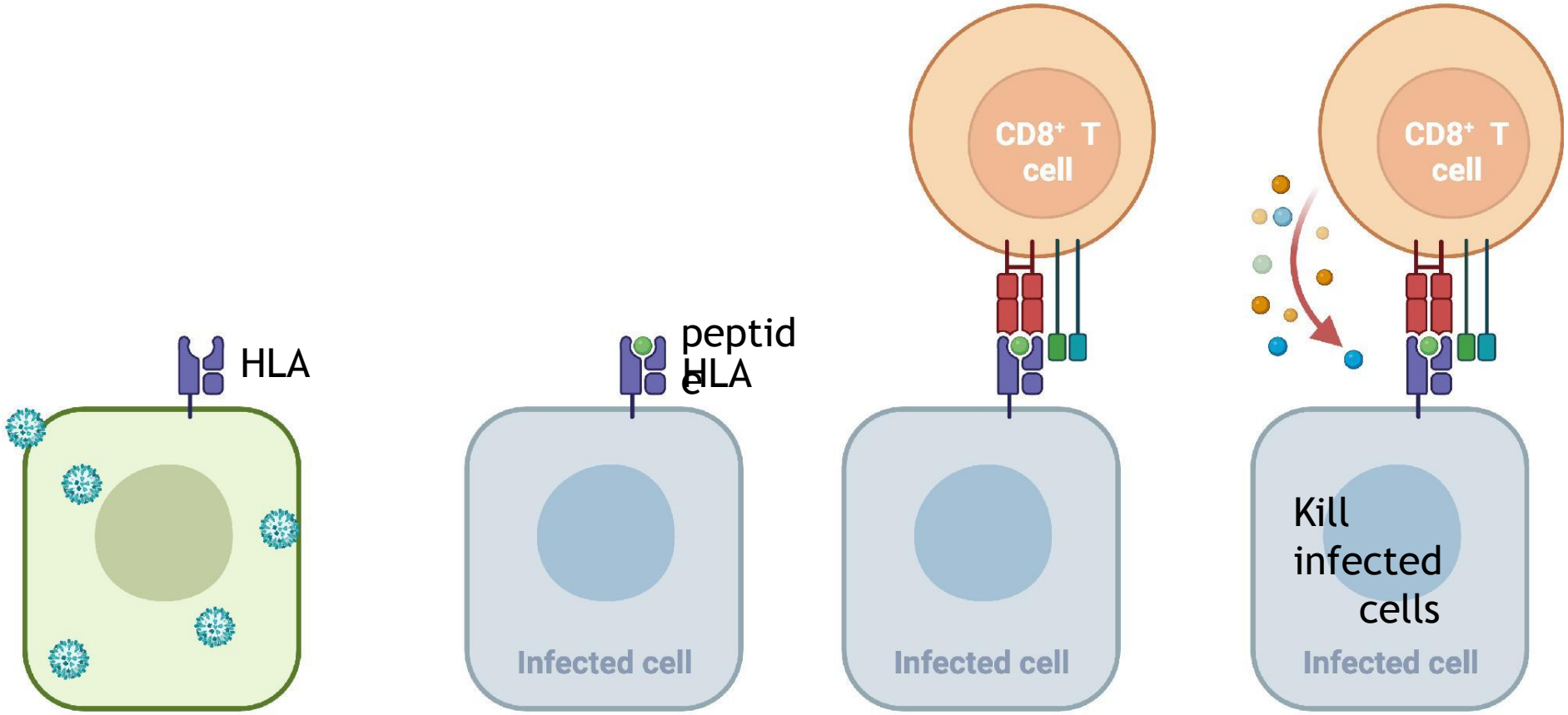


Figure by CE van de Sandt - Biorender

- Risk antigenic drift (influenza & SARS-CoV-2)
- Risk rapid waning of immunity (RSV)
- Tested in healthy adults
- Work best when boosting naïve immune responses

Harnessing CD8$^+$ T cells

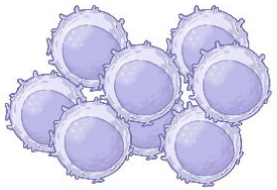


- Recognize conserved internal viral proteins (cross-reactive)
- Important second line of defense by preventing severe disease outcome

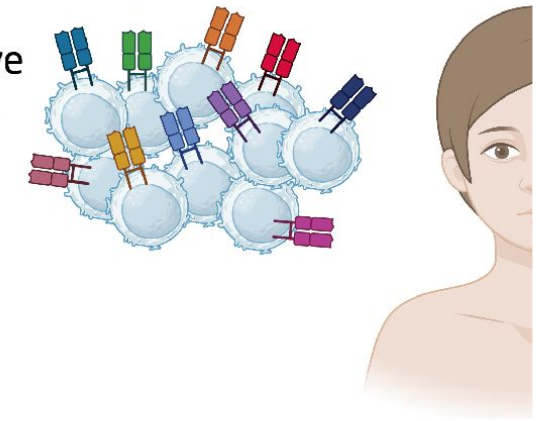
Figure by CE van de Sandt - Biorender

Immunity in vulnerable populations & rethinking vaccine strategies

Large naive
B cell pool



Large naive
T cell pool
large TCR
diversity



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Immunity in vulnerable populations & rethinking vaccine strategies

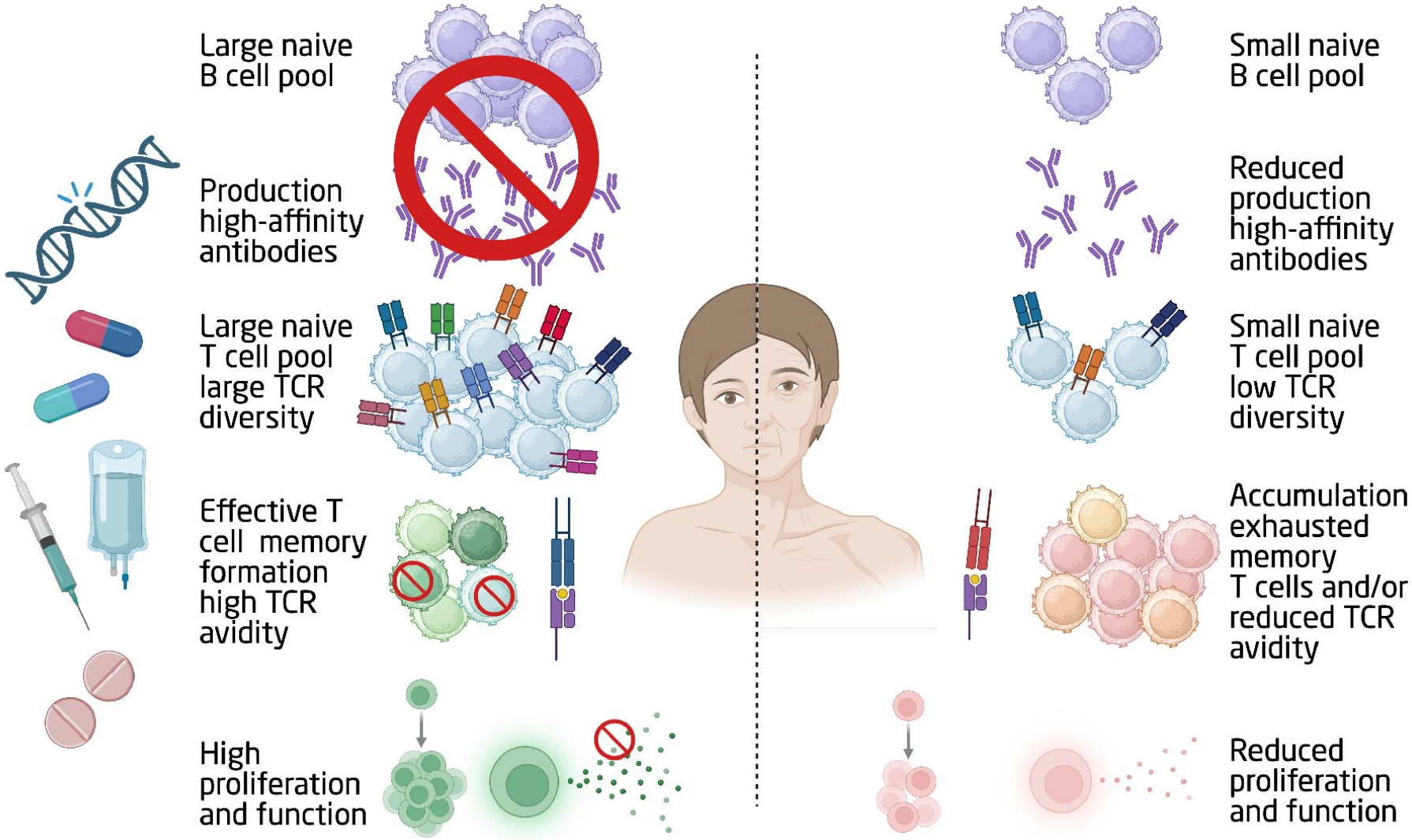

Figure by CE van de Sandt - Biorender

- Vulnerable populations have other Correlates of Protection
- Harnessing multiple parts of the immune system can increase protection against severe disease
- Timing medications and vaccines matters
- Vaccines should be designed for and